

Subsidence & Climate Change

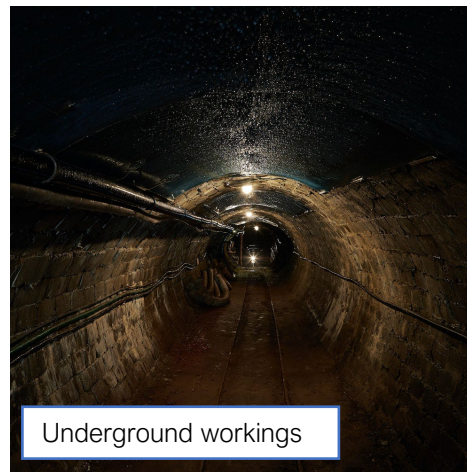


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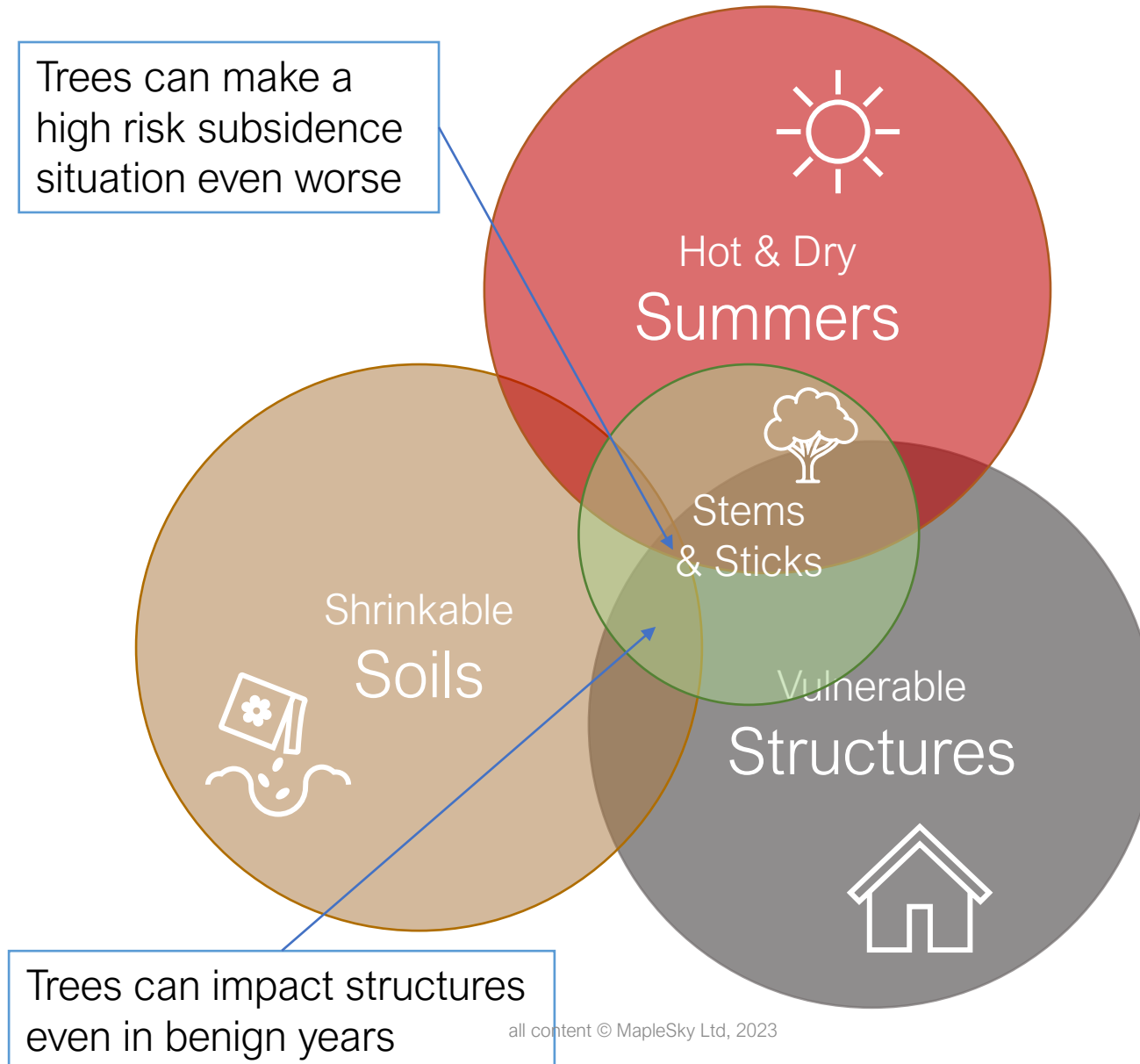
We create maps and models to help organisations quantify their current and future environmental risks, so we can create a more resilient future, together.

Causes of “subsidence”

1. Clay soil related shrinkage (with 70% involving trees)
2. Peat shrinkage - dewatering
3. Sand washout
4. Mining (Coal and non-coal)
5. Natural cavities / dissolution – karstic gypsum
6. Brine extraction (Cheshire)
7. Landslip



What causes subsidence?



Subsidence – beyond houses!

Pipes

Houses &
Low-Rise Buildings

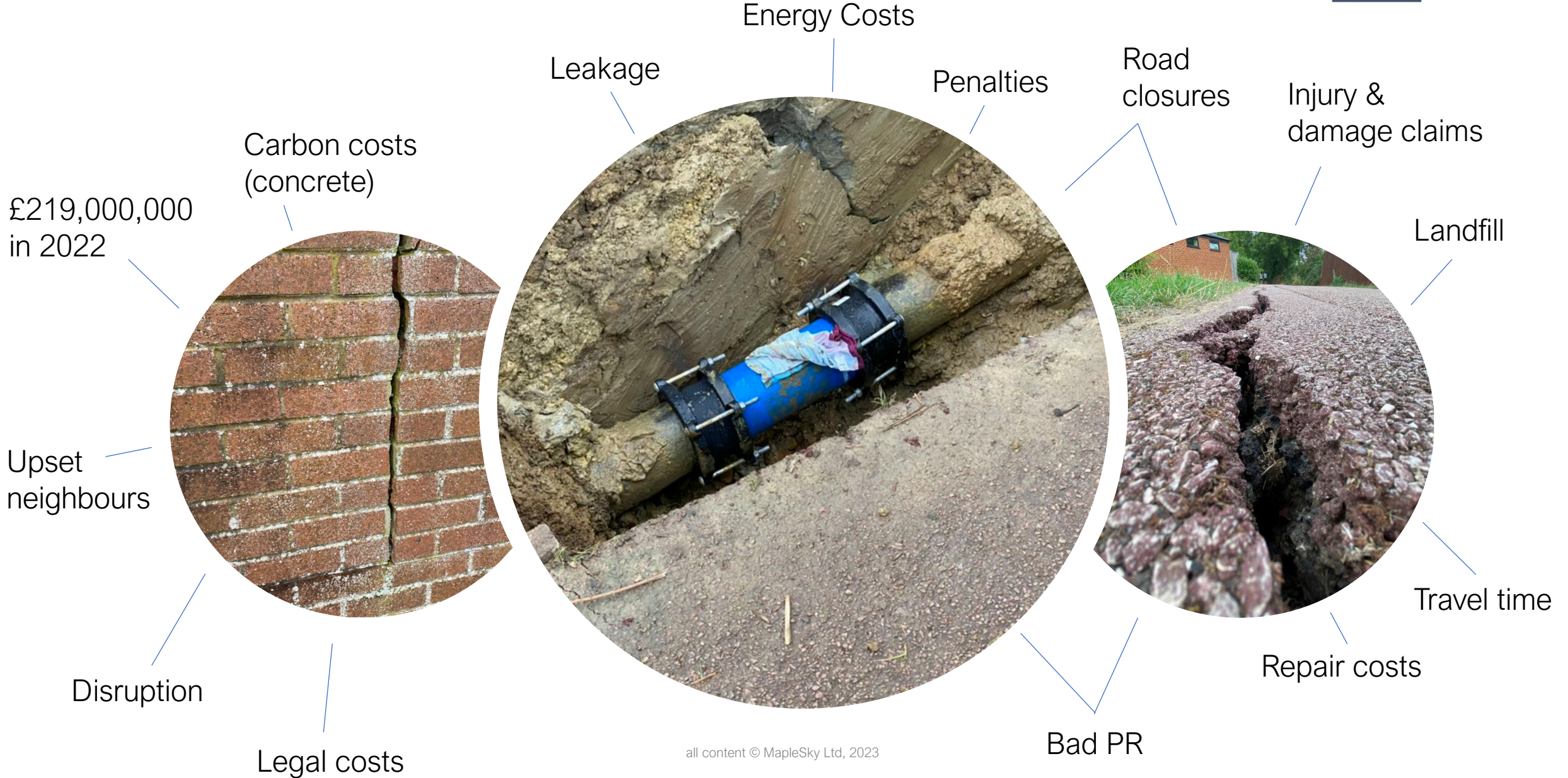


Roads and Paths

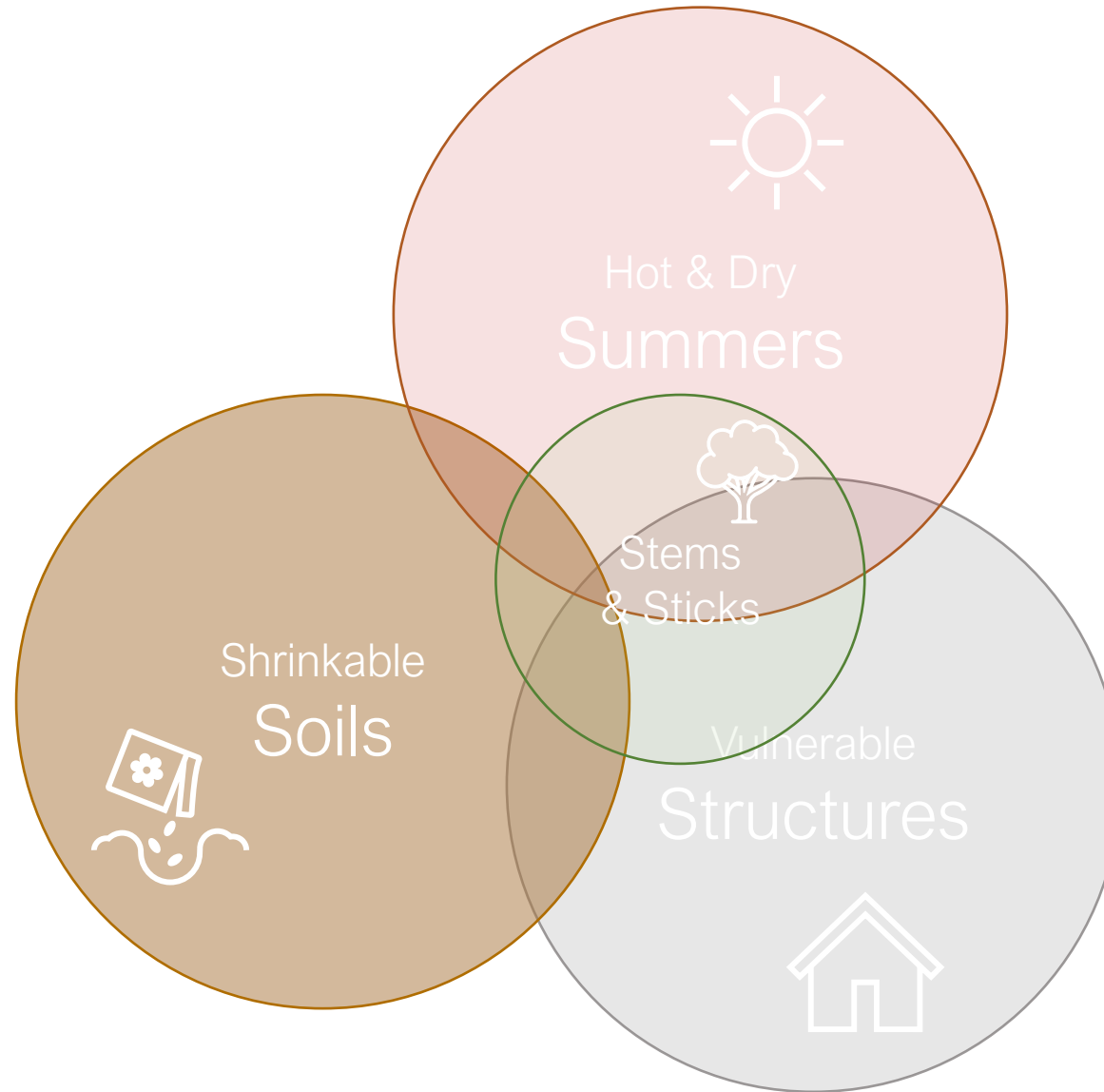


While home insurance claims can be expensive... infrastructure costs can be even more severe!

Hidden costs of ground movement



What causes subsidence?



Can the soil shrink?



April



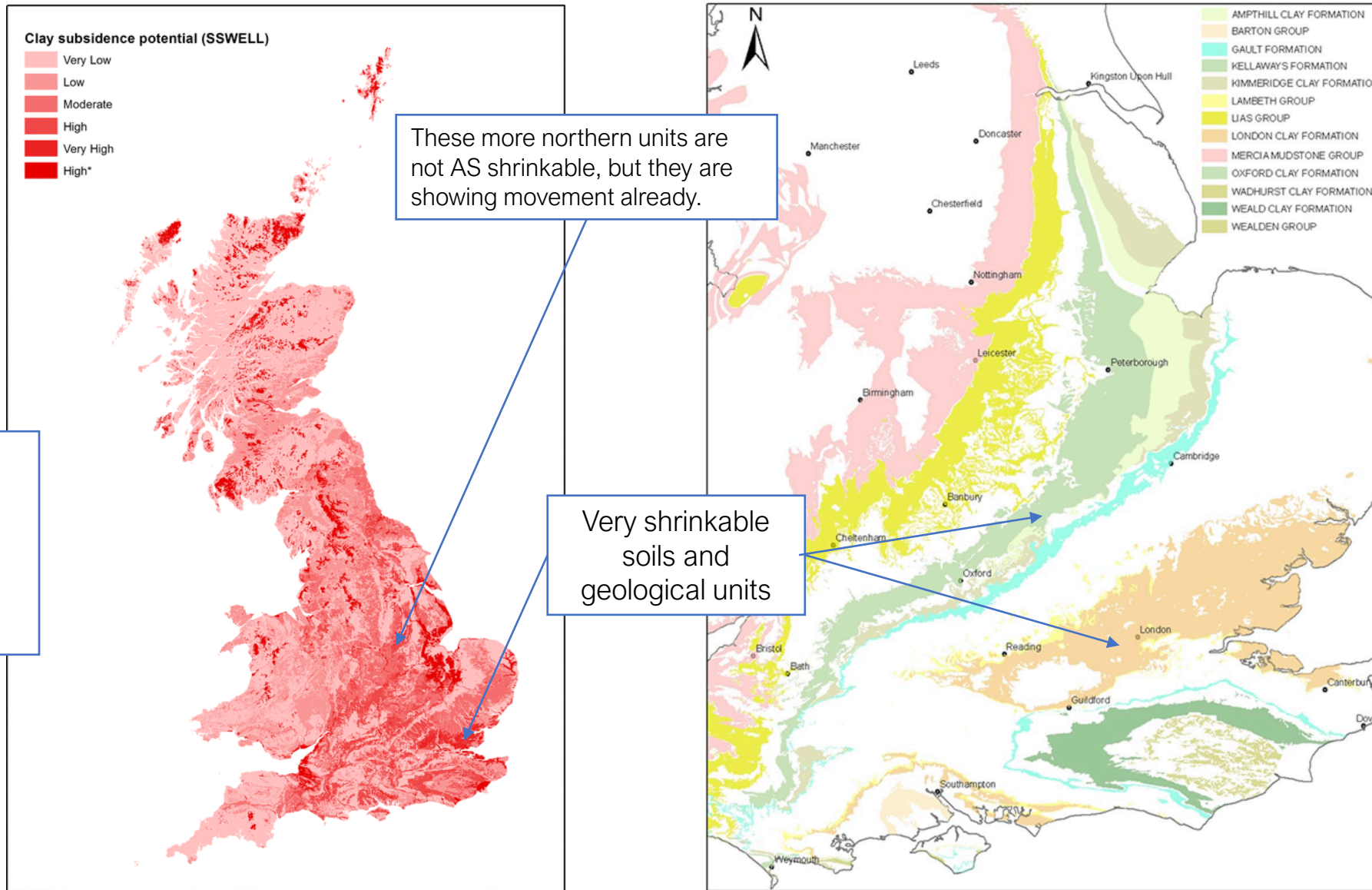
August



October

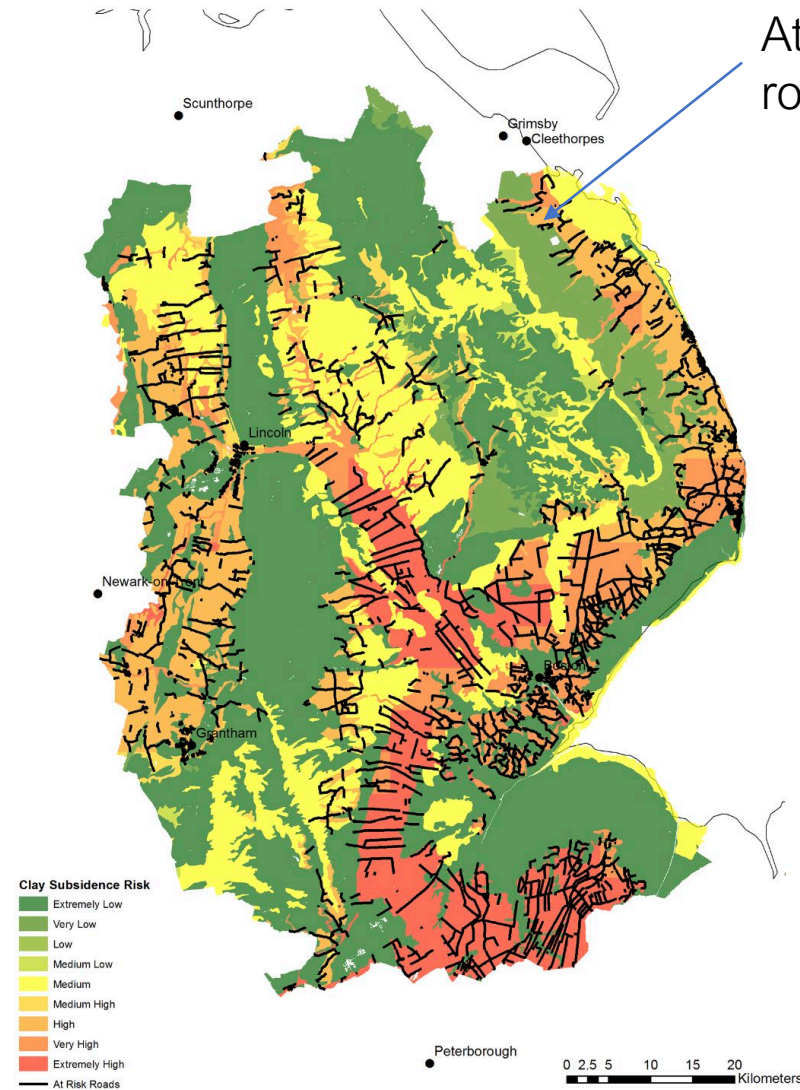


Shrinkable soils & geology



There are moderately shrinkable soils across much of the UK...

... but most don't currently dry out in a typical summer



At risk Lincolnshire roads

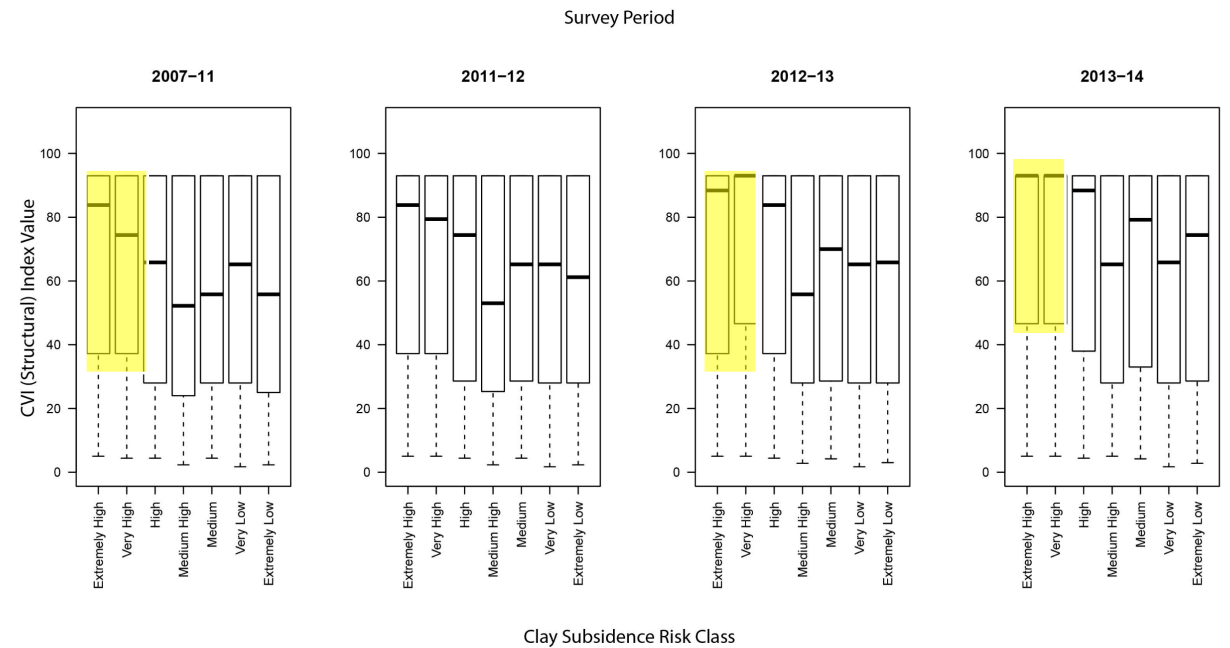


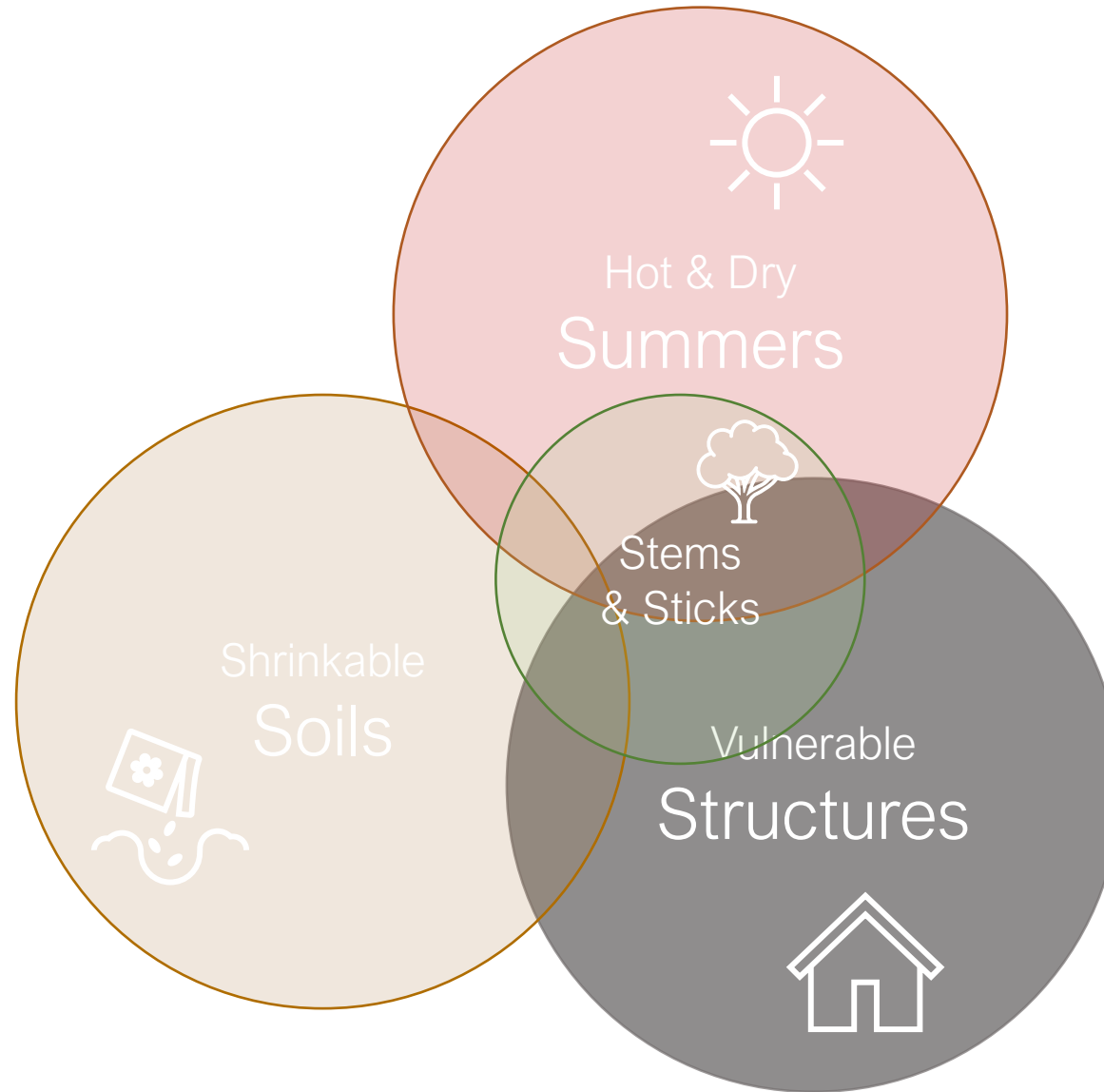
Figure 5. Clay subsidence risk against structural CVI (coarse visual inspection).

www.nat-hazards-earth-syst-sci.net/15/2079/2015/

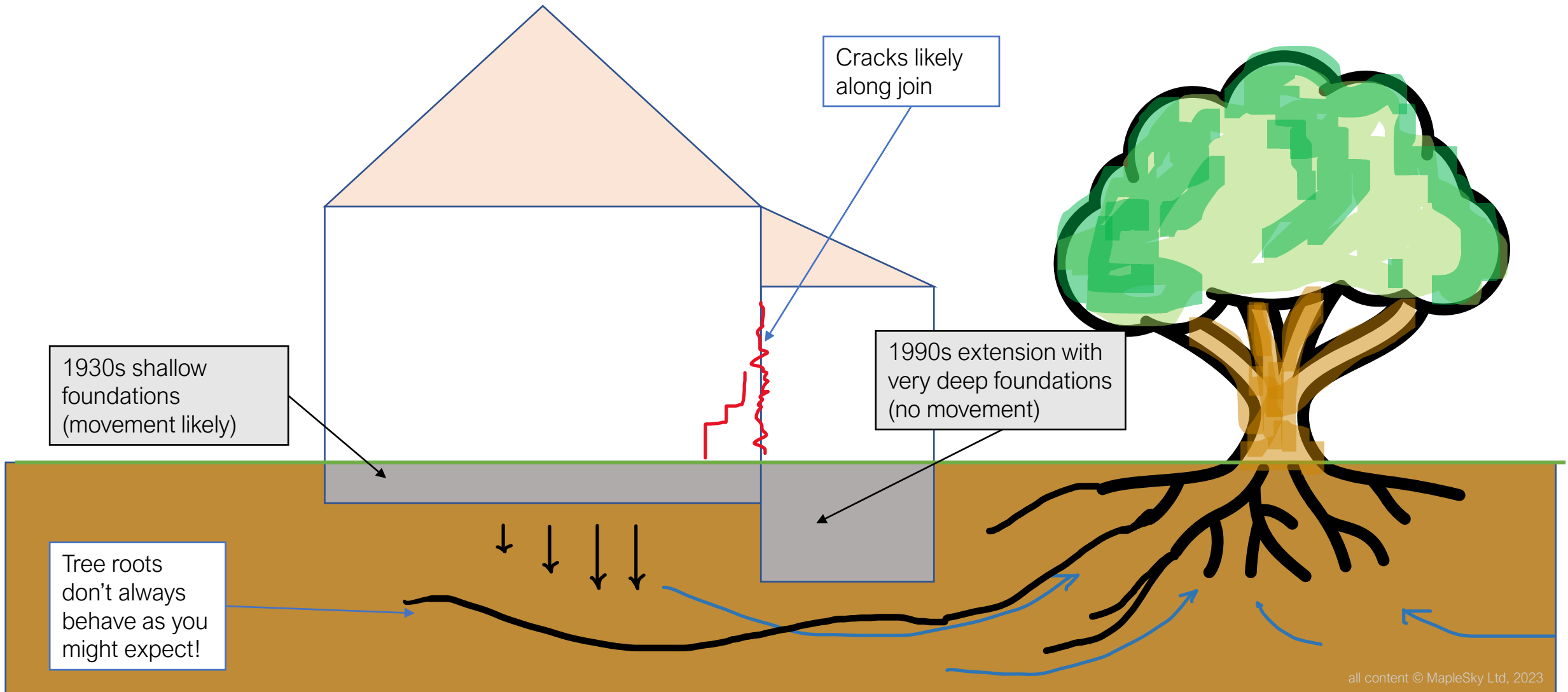
Nat. Hazards Earth Syst. Sci., 15, 2079–2090, 2015

Figure 6. Road sections identified “at risk” of clay-related subsidence at present (soils data (England and Wales)© Cranfield University and for the controller of HMSO 2015).

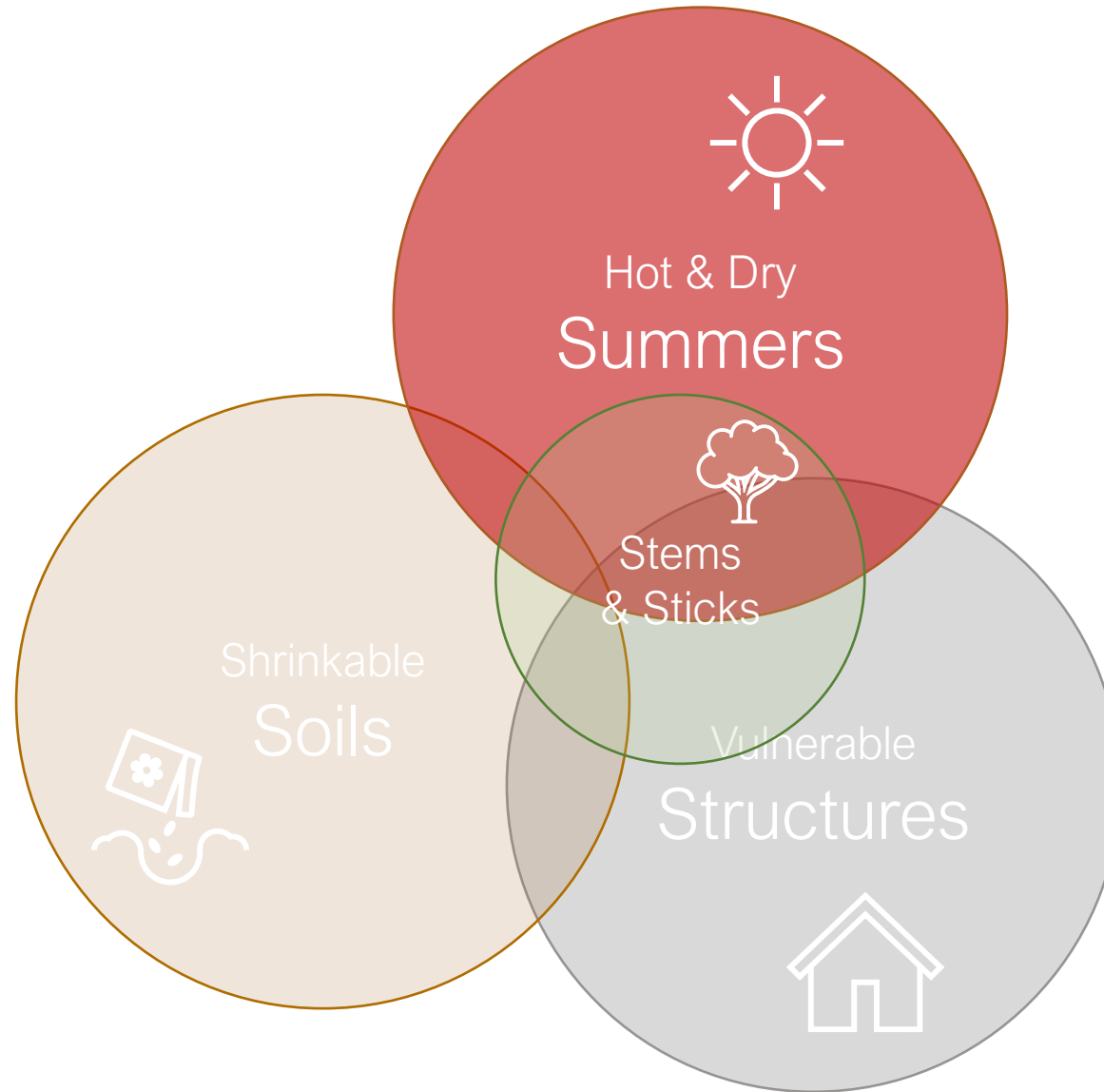
What causes subsidence?



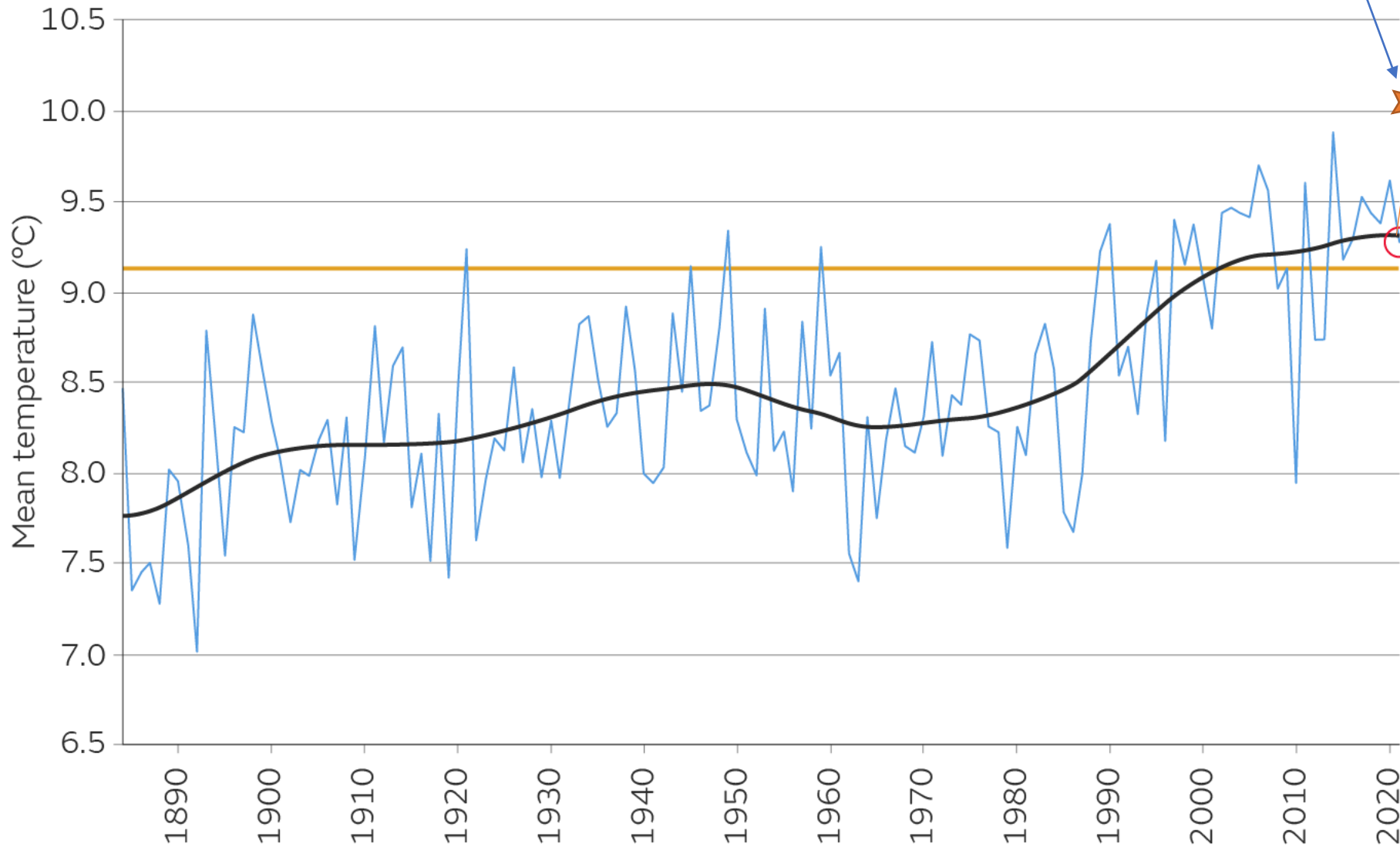
Structural factors



What causes subsidence?



Mean UK temperature by year



2022 was EVEN HOTTER

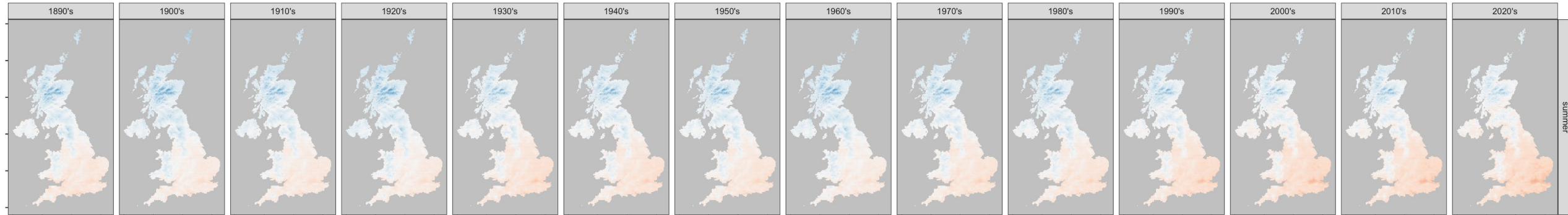
- Actual mean
- Trend
- 1991-2020 average

Although 2021 mean temperature is now considered unremarkable, pre-1990 this would have been one of the warmest years on record.

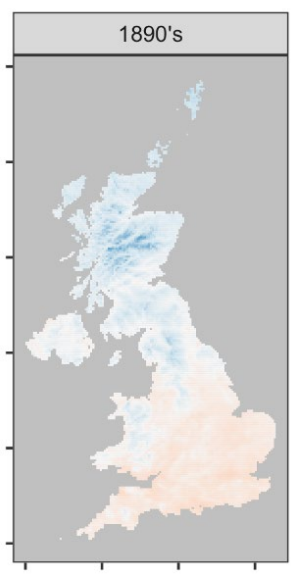
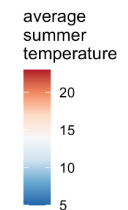
Source: HadUK-Grid 20/05/2022

UK changing climate

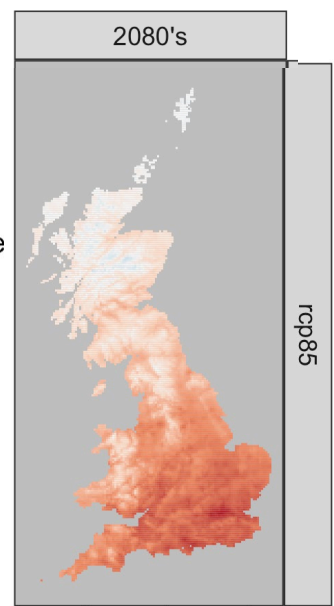
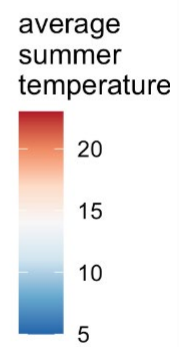
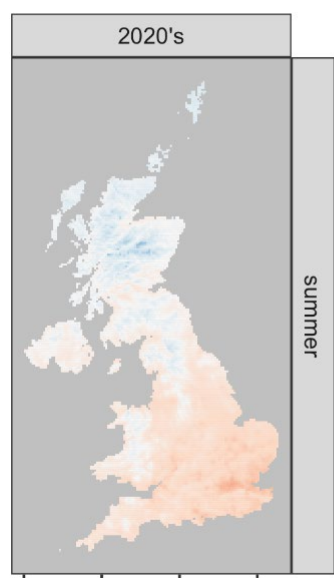
average summer temperature by decade



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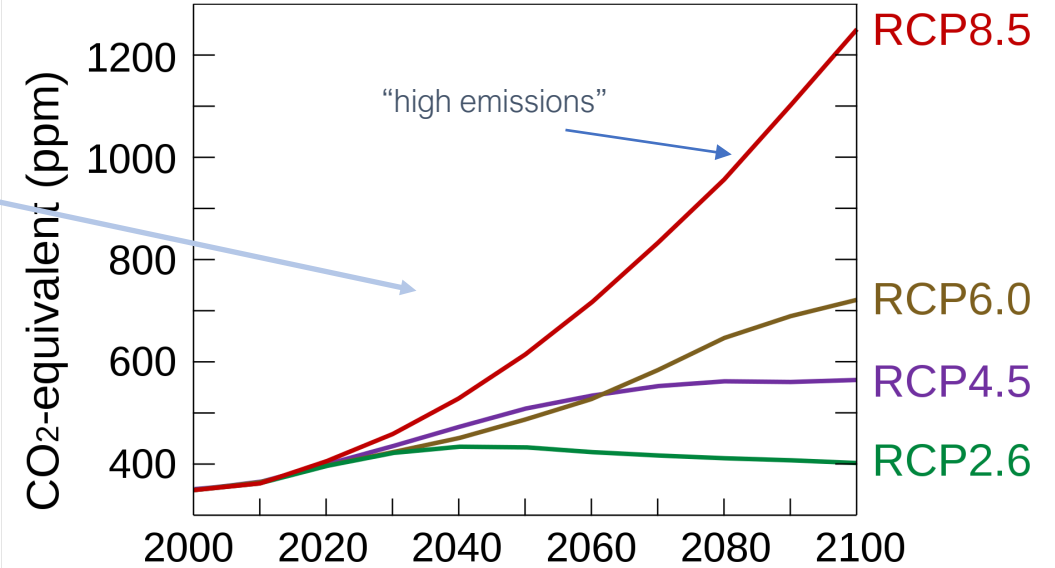
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On our current trajectory, things are set to get a lot worse

Climate Modelling (UKCP18)

IPCC Representative Concentration Pathways

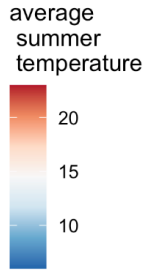


4 Representative Concentration Pathways (RCP) / emissions scenarios

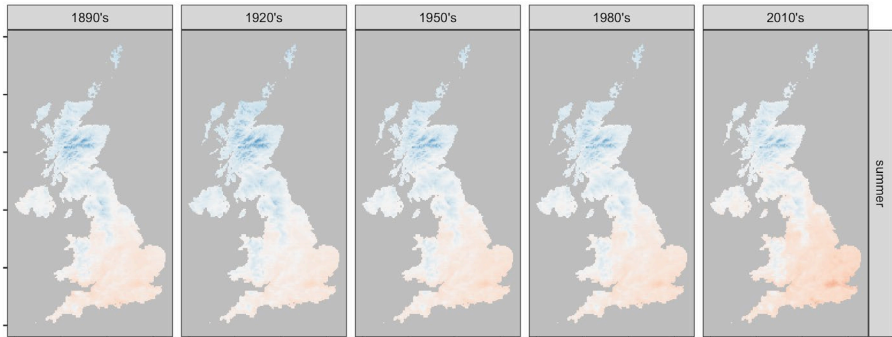
8 "decadal time-slices"

	1980	1990	2000	2010	2020	2030	2040	2050	2060	2070	2080	2090	2100
baseline	1981-2010												
2020s				2010-2039									
2030s					2020-2049								
2040s						2030-2059							
2050s							2040-2069 (~ 2°C)						
2060s								2050-2079					
2070s									2060-2089				
2080s										2070-2099 (~ 3.7°C)			

UK changing climate



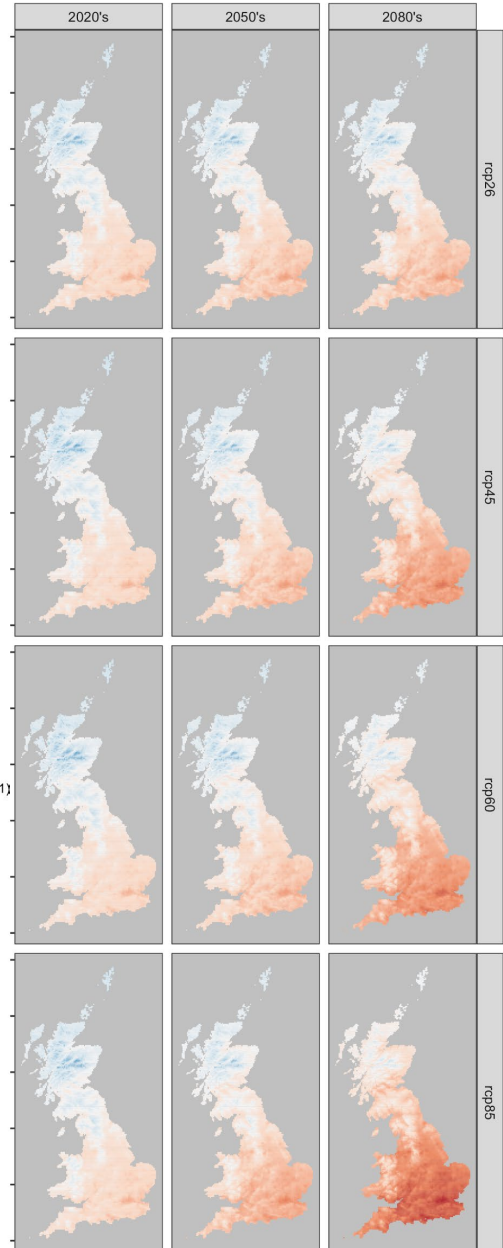
2. Even RCP 2.6 (low emissions) still results in much hotter temperatures.



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1. Our summers are already gradually warming...

3. RCP 8.5 (high emissions) is so much worse...



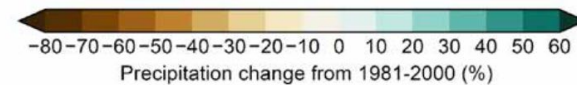
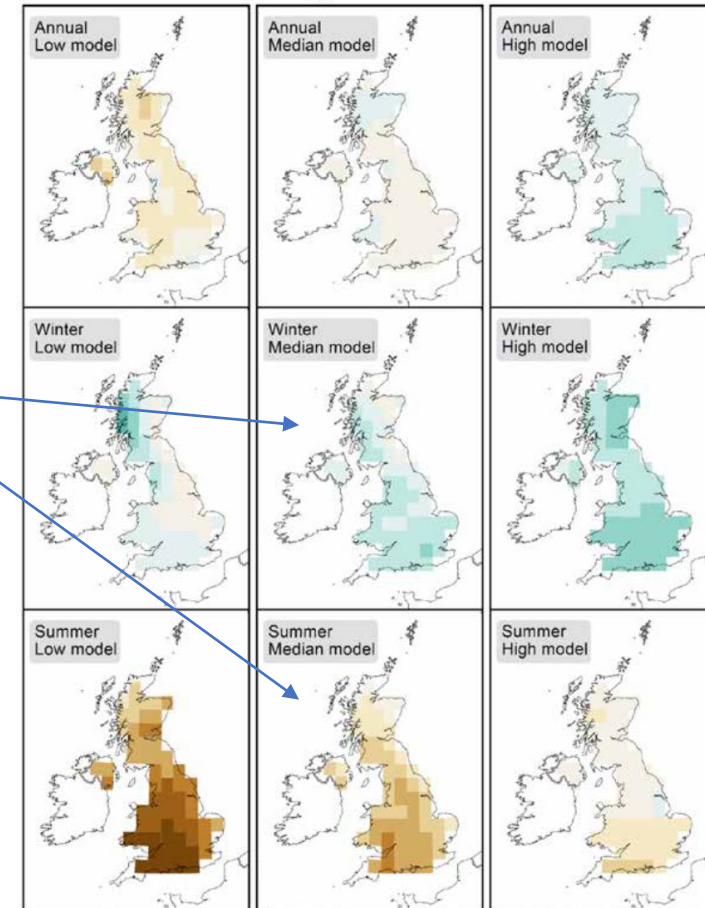
By the end of the century...

- NE and Midlands will be hotter than London and SE today
- SE will be even more prone to subsidence and infrastructure failure
- Most people will be wishing their parents had taken climate change more seriously.



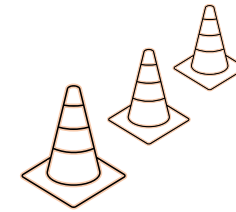
1. Hotter, drier summers
2. Warmer, wetter winters
3. “Extreme” weather more common
4. Rising sea levels

Projected change in precipitation in the exemplar
for time when global warming reaches
4 °C above pre-industrial levels



Hotter drier summers will result in:

- More **subsidence claims** & claims in new areas
- More degrading and **failed roads**
- More **burst pipes** and **higher leakage**



Steps to lower future risk

1. Identify your **areas and assets currently at risk**
2. Identify your **changing and future risks**
3. Identify your specific **key interventions to reduce risk**



Want to know more?

Questions or chat about your area?

Scan here:

Or connect via:

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maplesky.co.uk

Thanks!

